400 Seventh Street, S.W.
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U.S. Department
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**National Highway
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*** *** ***

TRANSPORTATION SCIENCES CENTER
ACCIDENT RESEARCH GROUP

Division of Arvin/Calspan
[redacted]

CALSPAN ON-SITE NONDEPLOYED AIR BAG INVESTIGATION

CALSPAN CASE NO. 92-1

VEHICLE - 1990 TOYOTA CELICA

LOCATION - [redacted], NY

ACCIDENT DATE - [redacted], 1992

Contract No. DTNH22-87-C-27169

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the precrash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

Calspan On-Site Non-Deployed Air Bag Investigation
Calspan Case No. 92-1
Vehicle - 1990 Toyota Celica GT
Location - [redacted] NY

Summary

This on-site investigation focused on a 1990 Toyota Celica GT that was involved in a minor sideswipe collision with a 1981 Chevrolet El Camino and subsequent impact sequences with a median barrier and a box beam guardrail system. The crash occurred on a snow covered, four lane divided expressway in [redacted] NY on [redacted] 1992, at 0900 hours. The driver/owner of the Toyota Celica notified the NHTSA Auto Safety Hotline on [redacted] and reported that the driver air bag system in her vehicle failed to deploy as a result of a frontal impact sequence with a guardrail. Calspan was notified of the complaint on February [redacted] and initiated an on-site inspection of the Toyota Celica and the crash scene on [redacted]

The vehicle was inspected at a local body shop and was under repair at the time of our inspection. The damaged frontal components (i.e., front bumper, grille, and left front fender) and the rear bumper and taillamp assemblies were removed from the vehicle. The 1990 Toyota Celica GT was a 2 dr. hatchback with an odometer reading of 10,233 miles and V.I.N.: JT2ST87N4L0 (production number deleted). The vehicle was manufactured in Japan during [redacted], 1990. The Toyota was equipped with a supplemental driver side air bag system, power assisted rack-and-pinion steering, power assisted front disc/rear drum brakes, and a 4-speed automatic/overdrive transmission.

The Toyota Celica was traveling in a southerly direction on the inboard (left) travel lane of the expressway at a driver estimated speed of 50 mph. Vehicle #2, the 1981 Chevrolet El Camino, was traveling in the outboard southbound lane at a speed that was slightly less than the speed of the Toyota. As the Toyota began to pass vehicle #2, the driver of vehicle #2 either initiated a lane change maneuver to the left or allowed his vehicle to drift across the broken white center lane line. The driver of the Toyota noted vehicle #2 as it encroached into her lane of travel. She sounded her horn to alert driver #2 of her presence, however, he continued to drift into the inboard travel lane.

The left front bumper corner area of vehicle #2 sideswiped the right door and quarter panel area of the air bag equipped Toyota Celica. Direct contact damage on the Celica began 70.25" forward of the right rear axle and continued rearward to the rear wheel opening, ending 8" forward of the rear axle. Maximum crush was 1.5" located on the rear 1/3rd of the door, 45.5" forward of the axle position. Crush values at the rub strip level of the door and quarter panel were as follows: $C_1 = 0.0$, $C_2 = 0.0$, $C_3 = 0.5"$, $C_4 = 1.25"$, $C_5 = 0.375"$, $C_6 = 0.0"$. The Toyota sustained a 12 o'clock impact force (CDC: 12-RZES-1) from the minor severity sideswipe impact configuration. As a result of the impact sequence with vehicle #2, the Toyota yawed slightly in a

clockwise direction due to rearward location of the damage with respect to the vehicle's center of gravity and minimal snagging of the vehicle at the leading edge of the quarter panel.

The left rear quarter panel area of the Toyota Celica impacted the box beam median barrier as the vehicle rotated approximately 15-25° in a clockwise (CW) direction. The 11 o'clock direction of force (CDC: 11-LBES-2) impact resulted in minor sheetmetal damage to the vehicle. Direct contact damage began 6.75" rearward of the left rear axle and extended 19.75" rearward. Maximum crush was approximately 2.0" located 12" rearward of the axle position. There was no residual or direct contact damage to the rear bumper facia or bumper reinforcement bar. The lower edge of the box beam medium barrier was 20" above a raised concrete curb. A snow and ice buildup obscured the face of the 6" barrier curb and transformed it into a mountable surface.

The 11 o'clock direction of force impact to the left rear corner area of the vehicle redirected the Toyota in a counterclockwise (CCW) direction. The Celica rotated approximately 280° CCW across the southbound travel lanes and departed the right (west) shoulder. The left front corner area of the Toyota Celica impacted the box beam guardrail in an endswipe configuration with an initial force direction of 9-9:30 o'clock (CDC: 09-LFEE-5). Direct contact damage on the vehicle began at the left headlamp cover and extended laterally across the hood face to the centerpoint of the hood. As a result of the vehicle's initial engagement with the box beam, the hood was crushed both laterally right and slightly rearward. The bumper facia contacted the guardrail posts which resulted in laterally orientated striations on the lower portion of the facia. The contact damage began at the corner of the facia and extended laterally 19.25", ending at a point 5.25" left of center. There was no crush to the bumper assembly or left frame rail.

As the vehicle remained engaged with the box beam, its rotation was reversed from CCW (pre-impact) to CW. Due to the height of the guardrail (26" from paved shoulder to lower edge of box beam) and the CW rotation of the vehicle, the left front fender of the vehicle contacted and underrode the box beam guardrail. The top surface of the fender was crushed downward to a maximum depth of 2.5". Laterally oriented abrasions (direct contact damage) were located on the top surface of the fender which began at the leading edge and extended 22.25" rearward. The overall length of the fender was reduced from 50.5" pre-crash to 49.75" resulting in 0.75" of rearward displacement. The fender contact resulted in lateral displacement of the inner fender support structure forward of the shock tower. The lateral displacement of the fender support bucked the upper radiator support panel approximately 3" rearward.

The Toyota subsequently separated from the box beam guardrail in a backwards orientation and rolled to final rest on the right (west) shoulder. At rest, the vehicle was facing in a northerly direction, 180° opposite of its initial path of travel.

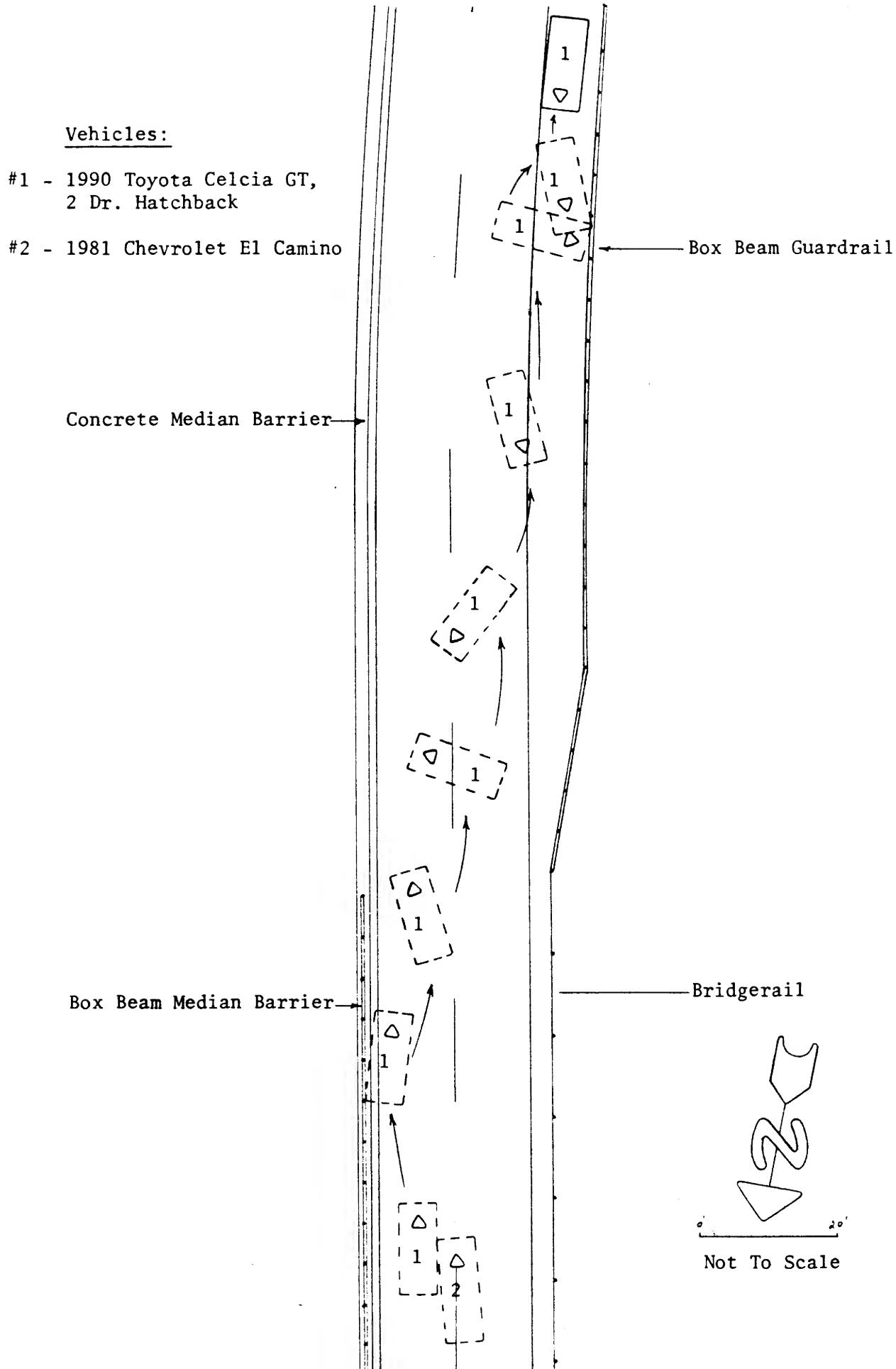
sufficiently to deploy the air bag system although an 11 o'clock impact force occurred. The third impact sequence with the box beam guardrail involved frontal components, however, several factors prevented the air bag system from deploying. The primary factor was the direction of force. The Toyota Celica rotated in a CCW direction across the roadway and impacted the box beam guardrail in an endswipe configuration with an initial impact force of 9-9:30 o'clock. The force direction was based on the displacement of the sheetmetal components and the lateral orientation of the abrasions on the hood face and bumper facia. In addition to the lateral impact force, the vehicle was involved in a "soft" collision which involved displacement of only sheetmetal components. There were no structural components (i.e., bumper, frame rail) crushed or displaced from the endswipe impact sequence. Although the collision was outside the scope of the CRASH program, it was doubtful that the vehicle sustained a sufficient decelerative pulse (regardless of the force direction) that is necessary to deploy the air bag system.

The air bag diagnostic system was tested to determine if there were stored faults in the system. With the assistance of the Toyota representative from the Washington, D.C. office, and telephone inputs from a regional Toyota service representative, the system was properly tested. A battery charger was connected to the vehicle's battery cables which provided sufficient power to the system. The ignition switch was turned to the run position and the air bag indicator lamp glowed for 6 seconds, then went out, indicating normal conditions. This test was repeated several times and yielded the same results. Next, a diagnostic code check was performed using a diagnostic module that was located in the engine compartment behind the left shock tower. With the ignition switch turned to the run position, terminals E_1 and T_C of the diagnostic module were bridged with a jumper wire. The air bag indicator light flashed in a continuous, uninterrupted sequence which indicates a normal system with no malfunctions (see page AB-30 of the attached service manual).

Following our inspection of the vehicle, reconstruction of the collision sequence, and diagnostic test of the air bag system, it is our opinion that the air bag system performed as designed and should not have deployed in this crash.

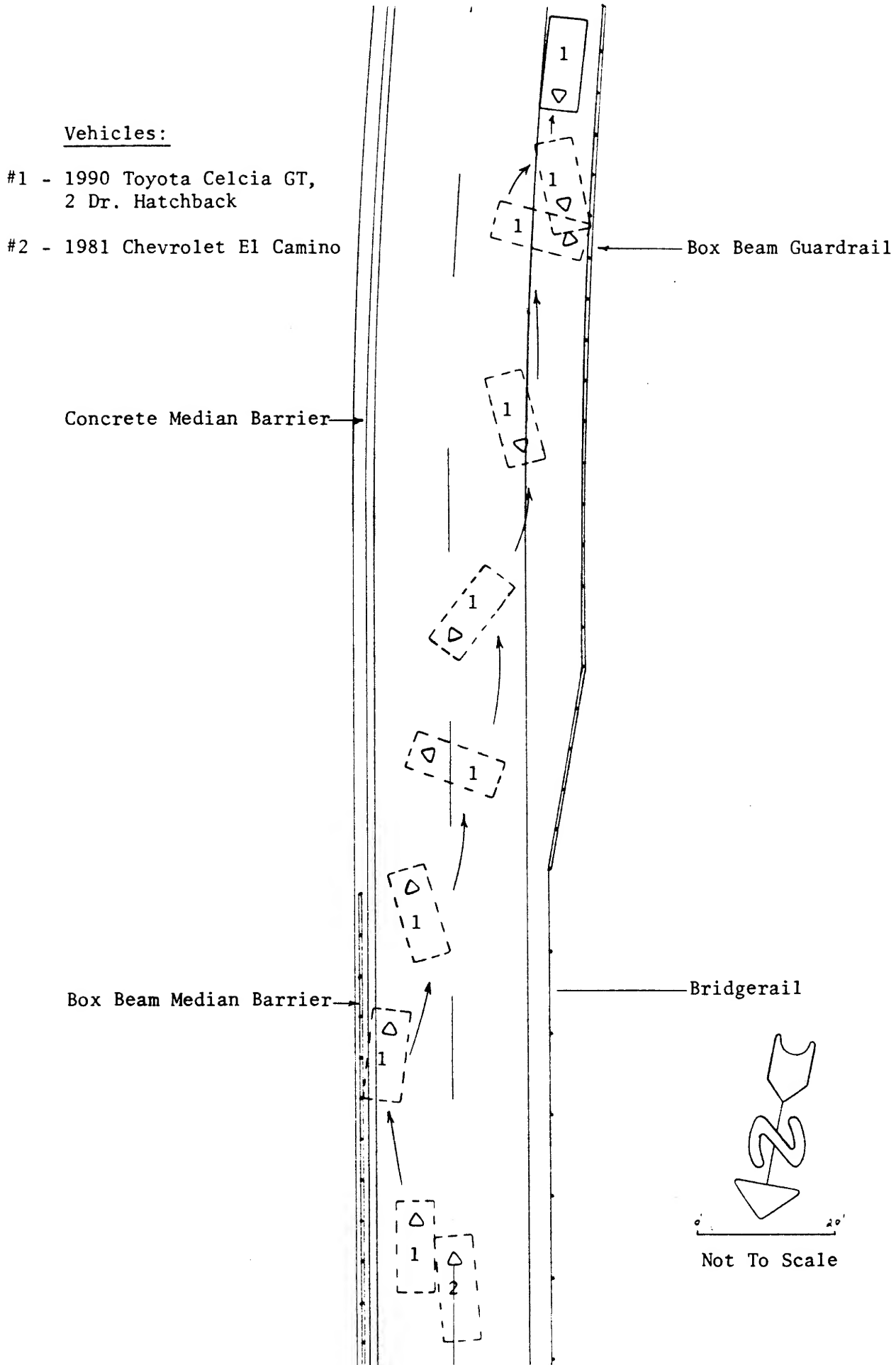
Accident Schematic

Calspan Case No. 92-1



Accident Schematic

Calspan Case No. 92-1



Selected Prints

Pre-Crash trajectory of the 1990 Toyota Celica GT

Struck box beam median barrier

Vehicle rotates in a clockwise direction across travel lanes

Frontal impact sequence with box beam guardrail

Possible areas of guardrail contact (Red paint transfers)

Lookback view of the Toyota's path of travel

Left frontal damage to the Toyota Celica GT

Direct contact damage to the front bumper facia (laterally orientated abrasions)

Left side view of the front bumper reinforcement bar

Sheetmetal deformation at the left frontal area

Left front three-quarter view

Perpendicular view of the displacement to the upper radiator support panel

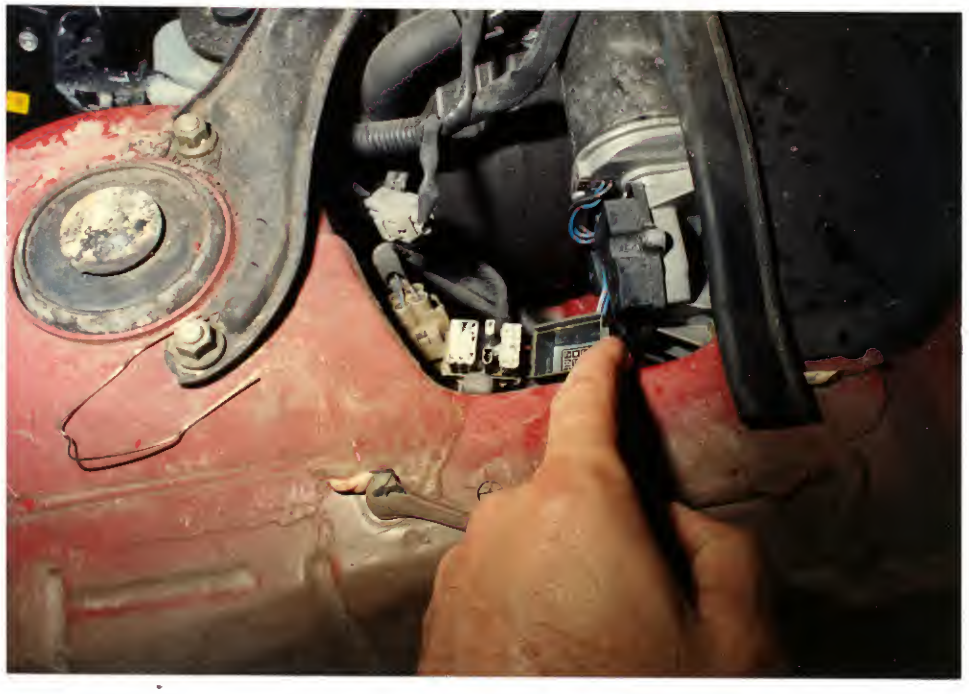
Damage to the top surface of the left front fender

Left front airbag crash sensor and yellow wiring harness

Close-up view of the crash sensor

Damage to the left rear quarter panel from the median barrier impact sequence

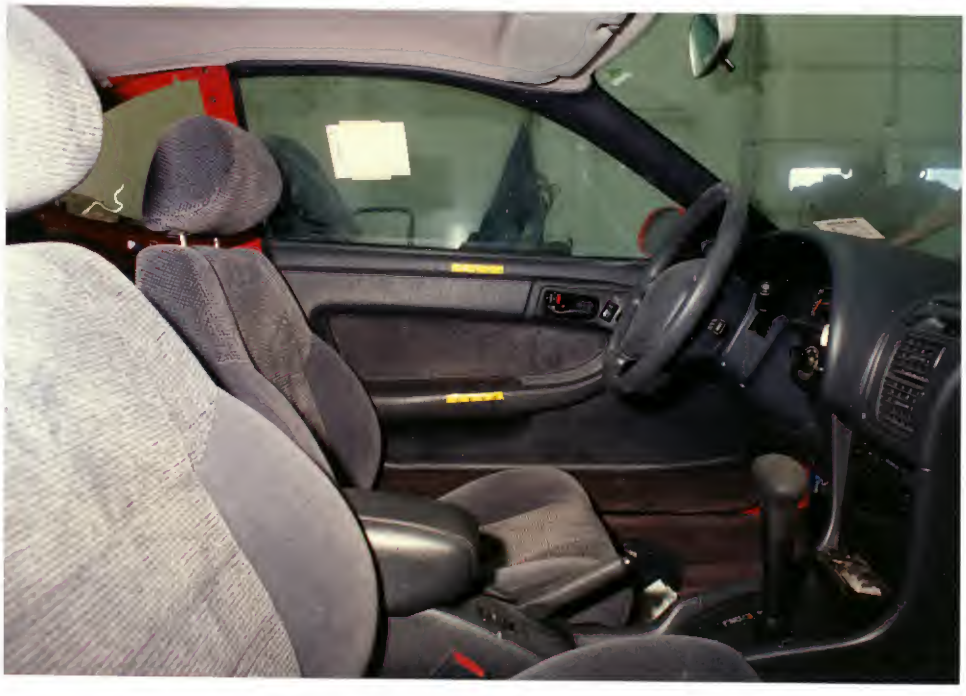
Sideswipe damage from contact with Vehicle #2



Air bag system diagnostic module located rearward of the left shock tower

Nondeployed driver air bag module

Knee bolster, no occupant contact



View across the interior from the right door area

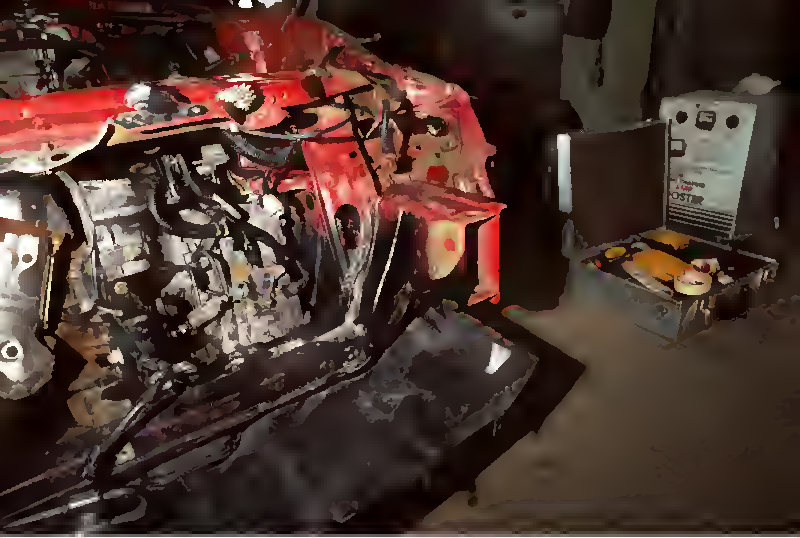
Probable driver contact to the left panel

Slide Index

Slide No.(s)	Description
1,2	Views of the left frontal damage
3	Close-up view of the left frame rail and radiator support panel
4	Longitudinal view of the left fender support and shock tower
5,6	Left front three-quarter views
7	Perpendicular view of the sheetmetal deformation
8	Hood deformation
9,10	Perpendicular views of the radiator support deformation
11	Removed front bumper facia
12-14	Close-up views of the contact damage to the left bumper facia
15,16	Front bumper reinforcement bar, not damaged
17-20	Left front fender damage
21	Longitudinal view of the fender deformation
22	Left side view
23,24	Left front air bag crash sensor and wiring harness (yellow polyloom)
25	Left rear side view
26-29	Left rear damage from the median barrier impact sequence
30	Deformation of the cargo area from the median barrier impact
31,32	Rear bumper, removed from vehicle
33	Rear bumper reinforcement bar
34	Right rear three-quarter view
35-38	Initial sideswipe damage from Vehicle #2
39	Right front three-quarter view
40	Perpendicular view of the radiator support deformation
41	Vehicle identification label affixed to left door
42	Damaged battery
43	Overall interior view from the left door area
44	Steering assembly and the nondeployed air bag module
45	Knee bolster area, no evidence of contact
46	Driver's seated position
47	Driver's active belt webbing and latchplate, not worn during crash
48,49	Left door panel
50	Probable left hip contact to armrest
51,52	Views across the interior from the right door area
53	Forward view from the rear hatch area

CA 9201 #1

CA 9201 #2



CA 9201 #3

CA 9201 #4

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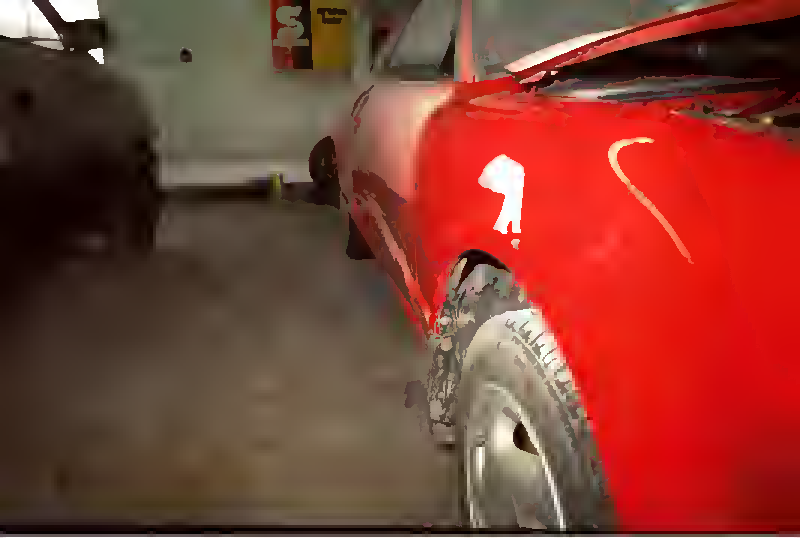
CA 9201 #37



CA 9201 #38

CA 9201 #39

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CA 9201 #48
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CA 9201 #52
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CA 9201 #53

Toyota's Service Manual

SRS AIRBAG

AB

GENERAL DESCRIPTION

The 1990 CELICA for USA specifications is equipped with an SRS (Supplemental Restraint S airbag.

Failure to carry out service operations in the correct sequence could cause the airbag system t pectedly deploy during servicing, possibly leading to a serious accident.

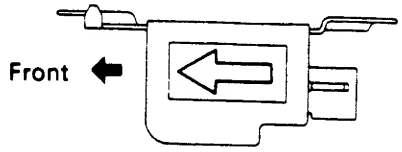
Further, if a mistake is made in servicing the airbag system, it is possible the airbag may fail to c when required.

Before performing servicing (including removal or installation of parts, inspection or replacemer sure to read the following items carefully, then follow the correct procedure described in the manual.

1. Malfunction symptoms of the airbag system are difficult to confirm, so the diagnostic codes be the most important source of information when troubleshooting.
   When troubleshooting the airbag system, always inspect the diagnostic codes before disconne the battery (See page AB-24).
2. **Work must be started after approx. 20 seconds or longer from the time the ignition switc turned to the LOCK position and the negative (–) terminal cable is disconnected from the bat (The airbag system is equipped with a back-up power source so that if work is started with seconds of disconnecting the negative (–) terminal cable of the battery, the airbag may be ployed.)**
   When the negative (–) terminal cable is disconnected from the battery, memory of the clock and a systems will be cancelled. So before starting work, make a record of the contents memorized by e memory system. Then when work is finished, reset the clock and audio systems as before.
   To avoid erasing the memory of each memory system, never use a back-up power supply from outs the vehicle.
3. Even in cases of a minor collision where the airbag does not deploy, the front airbag sensors and steering wheel pad should be inspected (See page AB-11).
4. Never use airbag parts from another vehicle. When replacing parts, replace them with new part repairs.
5. Before repairs, remove the airbag sensors if shocks are likely to be applied to the sensors du
6. The center airbag sensor assembly contains mercury.
   After performing replacement, do not destroy the old part. When scrapping the vehicle or repl the center airbag sensor assembly itself, remove the center airbag sensor assembly and dispose as toxic waste.
7. Never disassemble and repair the front airbag sensors, center airbag sensor assembly or steering pad in order to reuse it.
8. If the front airbag sensors, center airbag sensor assembly or steering wheel pad have been dropp or if there are cracks, dents or other defects in the case, bracket or connector, replace them wi ones.
9. Do not expose the front airbag sensors, center airbag sensor assembly or steering wheel pad di to hot air or flames.
10. Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the elec circuit.
11. Information labels are attached to the periphery of the airbag components. Follow the not
12. After work on the airbag system is completed, perform the airbag warning light check (See AB-29).

FRONT AIRBAG SENSOR

1. Never reuse the front airbag sensors involved in a collision when the airbag has deployed. (Replace both the left and right airbag sensors.)
2. Install the front airbag sensor with the arrow on the sensor facing toward the front of the vehicle.
3. The front airbag sensor set bolts have been anti-rust treated.
   When the sensor is removed, always replace the set bolts with new ones.



AB0018

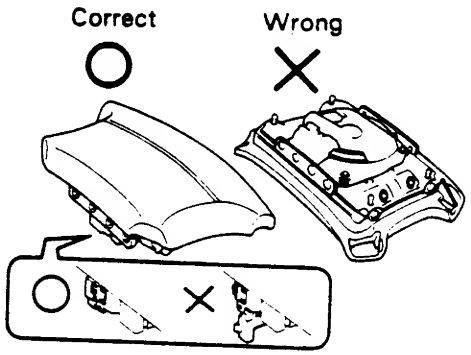
4. The front airbag sensor is equipped with an electrical connection check mechanism. Be sure to lock this mechanism securely when connecting the connector. If the connector is not securely locked, a malfunction code will be detected by the diagnosis system (See page AB-9).

SPIRAL CABLE (in COMBINATION SWITCH)

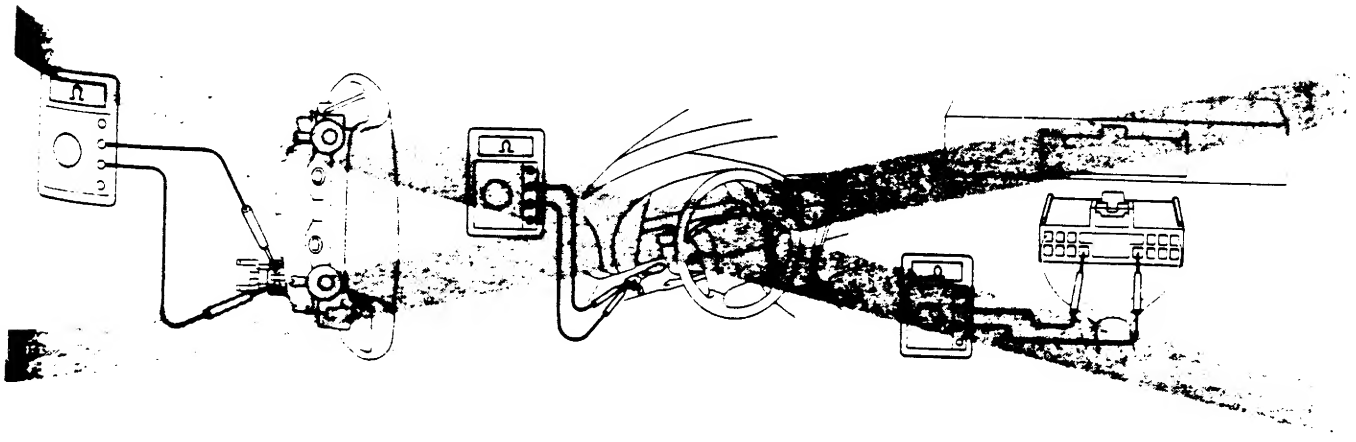
The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to page AB-16 of this manual concerning correct steering wheel installation.

STEERING WHEEL PAD (with AIRBAG)

1. **When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up.**
   In this case, the twin-lock type connector lock lever should be in the locked state and care should be taken to place it so the connector will not be damaged. And do not store a steering wheel pad on top of another one. (Storing the pad with its metallic surface up may lead to a serious accident if the airbag inflates for some reason.)
2. **Never measure the resistance of the airbag squib.**
   (This may cause the airbag to deploy, which is very dangerous.)



AB0128



AB0014 AB0179 AB0110

3. Grease should not be applied to the steering wheel pad and the pad should not be cleane detergents of any kind.
4. Store the steering wheel pad where the ambient temperature remains below 93°C (200°F), high humidity and away from electrical noise.
5. When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) the steering column near the combination switch connector before starting work.
6. When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed an SST before disposal (See page AB-82). Perform the operation in a place away from electrical

CENTER AIRBAG SENSOR ASSEMBLY

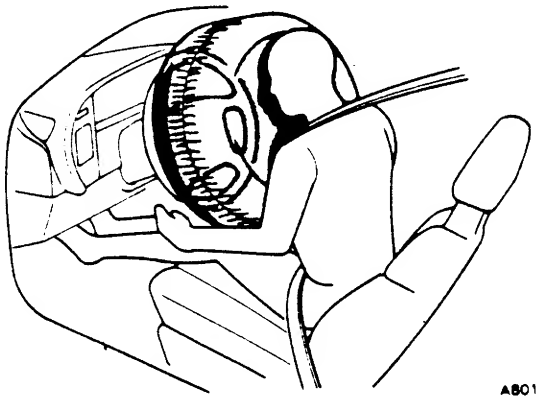
The connector to the center airbag sensor assembly should be connected or disconnected with the sor mounted on the floor. If the connector is connected or disconnected while the center airbag se assembly is not mounted to the floor, it could cause undesired ignition of the airbag system.

WIRE HARNESS AND CONNECTOR

The airbag system wire harness is integrated with the cowl wire harness assembly. The wires for the bag wire harness are encased in a yellow corrugated tube. All the connectors for the system are also standard yellow color. If the airbag system wire harness becomes disconnected or the connec becomes broken due to an accident, etc., repair or replace it as shown on page AB-21.

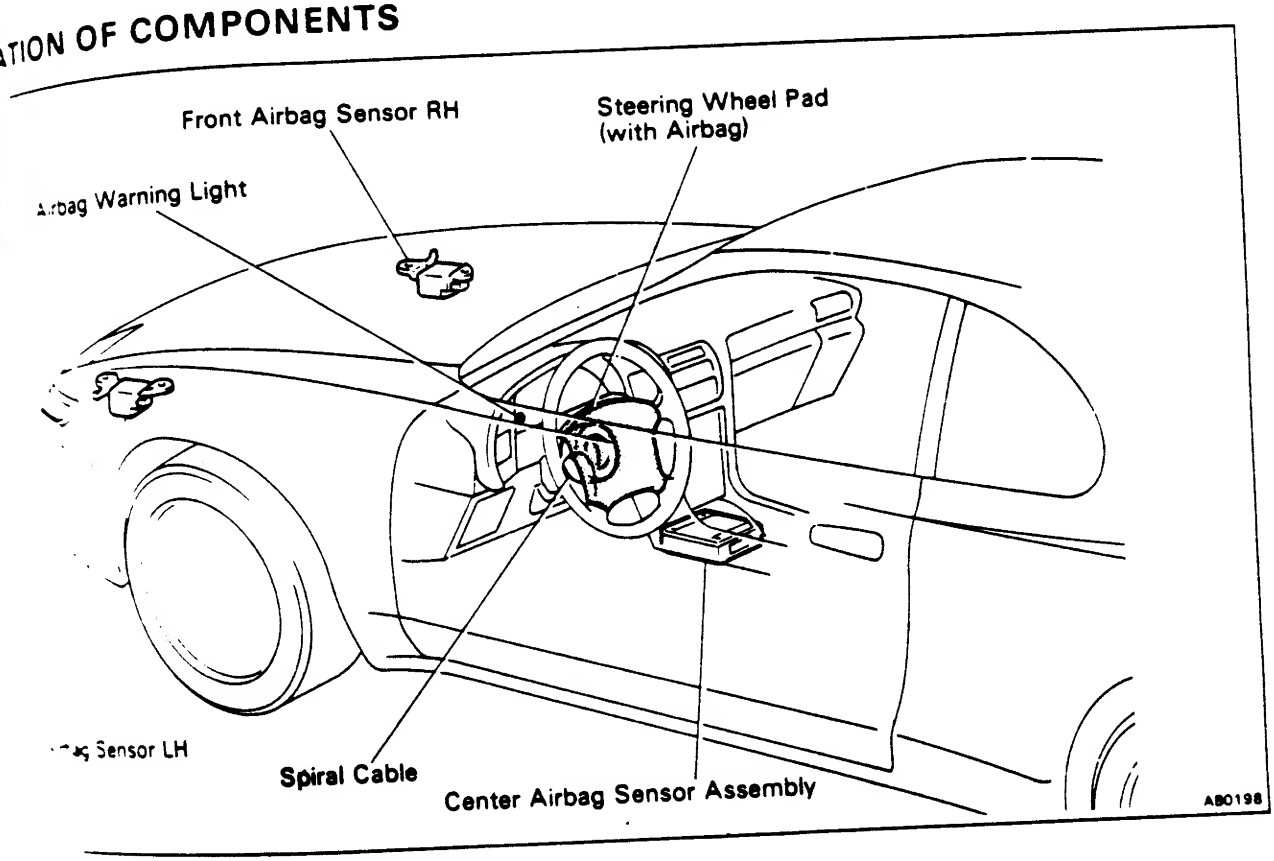
SCRIPTION

...S (Supplemental Restraint System) airbag, together ... seat belt, is designed to help protect the driver. In a ... the airbag sensors detect the shock, and if the front-... shock is greater than a specified value, an airbag stored ... steering wheel pad is inflated instantaneously to help ... the shock to the driver.



AB0197

...ATION OF COMPONENTS



AB0198

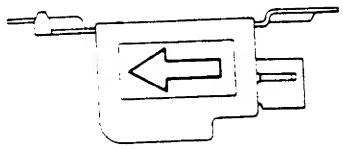
ERATION

NCTION OF COMPONENTS

NT AIRBAG SENSOR

...irbag sensor is mounted inside each of the front ... The sensor unit is a mechanical type. When the ... detects deceleration force above a predetermined ... collision, the contacts in the sensor make con- ...nding a signal to the center airbag sensor assem-

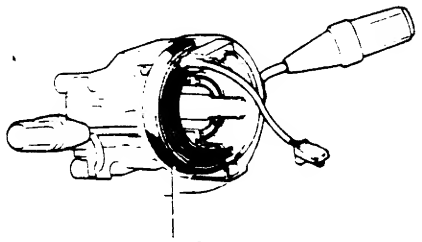
...sor cannot be disassembled.



AB0018

RAL CABLE (in COMBINATION SWITCH)

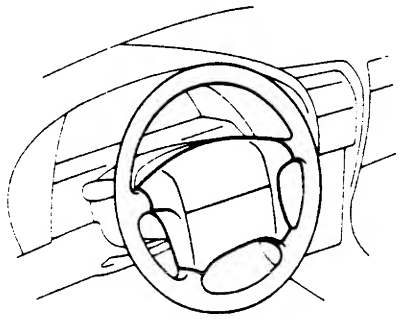
... cable is used as an electrical joint from the vehi- ...body side to the steering wheel.



Spiral Cable AB0250

STEERING WHEEL PAD (with AIRBAG)

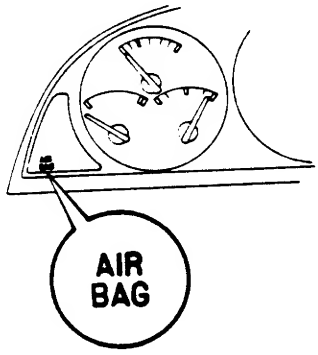
...flater and bag of the airbag system are stored in the ...ng wheel pad and cannot be disassembled. ...flater contains a squib, igniter charge, gas gener- ...etc and inflates the bag in case of a frontal collision.



AB0149

AIRBAG WARNING LIGHT

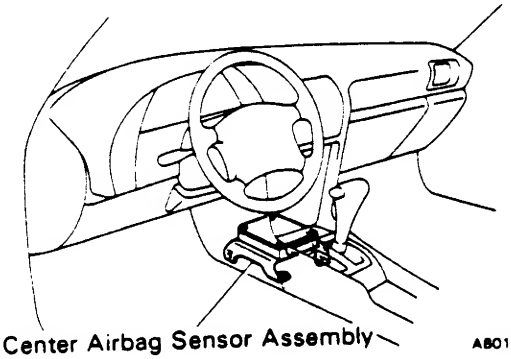
...airbag warning light is located on the combination ...ter. It goes on to alert the driver of trouble in the ...tem when a malfunction is detected in the center ...bag sensor assembly self-diagnosis. In normal operat- ...condition when the ignition switch is turned to the ACC or ON position, the light goes on for about 6 sec- ...ds and then goes off.



AB0199

CENTER AIRBAG SENSOR ASSEMBLY

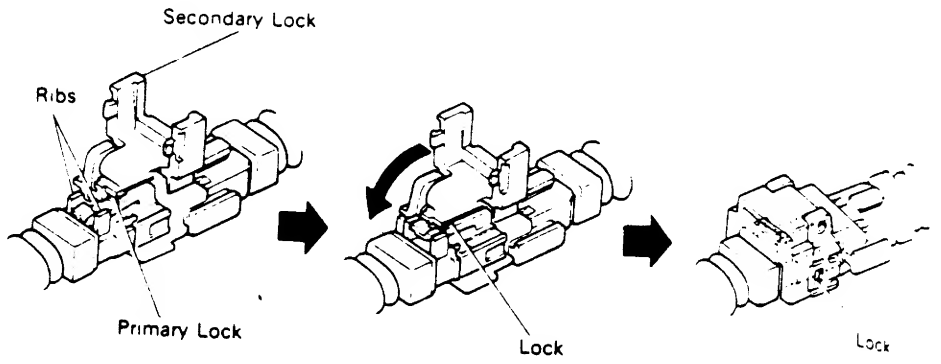
...center airbag sensor assembly is mounted on the ...or inside the center cluster. The center airbag sensor ...ssembly consists of a center airbag sensor, safing sen- ...ors, ignition control and drive circuit, diagnosis circuit, ...etc. It receives signals from the airbag sensors, judges ...whether the airbag must be activated or not and diag- ...oses system malfunctions.



Center Airbag Sensor Assembly AB0180

(4) Connector Twin-Lock Mechanism

With this mechanism connectors (male and female connectors) are locked by ... devices to increase connection reliability.
If the primary lock is incomplete, ribs interfere and prevent the secondary lock



- **Primary Lock Incomplete (Secondary Lock Prevented)**
- **Primary Lock Complete (Secondary Lock Permitted)**
- **Twin-Lock Comple...**

When the vehicle is involved in a frontal collision in the hatched area (Fig. 1) and the shock is ... a predetermined level, the airbag is activated automatically. Safing sensors are designed to ... smaller deceleration rate than the front and center airbag sensors. As illustrated in Fig. 2 be... is caused when current flows to the squib, which happens when a safing sensor and a front a... and/or the center airbag sensor go on simultaneously.

When a deceleration force acts on the sensors, it causes the squib to ignite. Gas is then ... increasing the pressure inside the bag rapidly. The inflated bag breaks open the steering whee... inflation then ends, and the gas is discharged through discharge holes provided behind the bag... becomes deflated as a result.

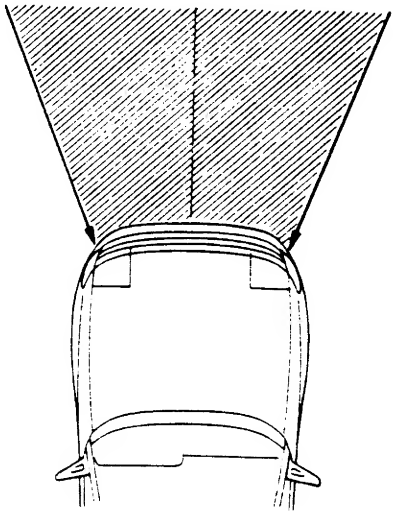


Fig. 1

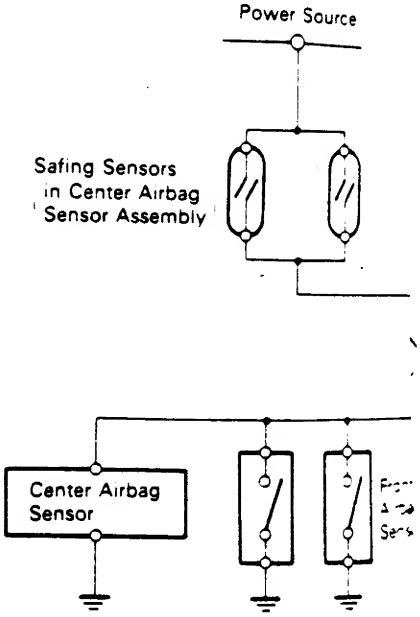


Fig. 2

AB0200

TROUBLESHOOTING

How To Proceed With Troubleshooting

Malfunction symptoms of the airbag system are difficult to confirm, so the diagnostic codes bec most important source of information when troubleshooting.
Preform troubleshooting of airbag system in accordance with the following procedure.

HINT: Do not disconnect the battery negative (–) terminal cable until step 3, Diagnostic Code and Recording, has been completed.

1 CUSTOMER PROBLEM ANALYSIS

Using the CUSTOMER PROBLEM ANALYSIS CHECK SHEET (See page AB-28) for refere the customer in as much detail as possible about the problem.

2 WARNING LIGHT CHECK

Check the airbag warning light. If the light remains on, a malfunction is stored in the cente sensor assembly, so proceed to step 3. If the airbag warning light is not on, a malfunc occurred in the airbag warning light circuit, so perform troubleshooting for code 22.

HINT: Code 22 is recorded when a malfunction occurs in the airbag warning light system If an open malfunction occurs in the airbag warning light system, the airbag warning light co light up, so that until the malfunction is repaired, the diagnostic codes (including code 22 be confirmed.

3 DIAGNOSTIC CODE CHECK AND RECORDING

Check the diagnostic codes and make a note of any malfunction codes which are output. If a code is output, an abnormality in the power source circuit may have occurred, so perform bleshooting for source voltage in step 8.

If code 22 is output, skip steps 4 and 5 and proceed to step 7.

4 CLEARING OF MALFUNCTION CODE (EXCEPT CODE 41)

Clear the malfunction code.

HINT: The malfunction code output in step 3 indicates that a malfunction has occurred circuit designated by the malfunction code, but does not indicate whether the malfunction occurring or whether it was in the past.
Accordingly, it is necessary to find out the present condition of the malfunction occurrence by c the malfunction code and performing the diagnostic code check again. If this operation is neg and troubleshooting is performed using only the malfunction code confirmed in step 3, so the problem component becomes difficult and invites mistaken diagnosis.

5 DIAGNOSTIC CODE CHECK AND RECORDING 6 SYMPTOM SIMULATION

After repeating ignition switch ON – OFF operation (ON: wait 20 secs., OFF: wait 20 secs.) 5 check the diagnostic code. If any code other than code 41 is output, the malfunction is still occ so proceed to step 7.

If code 41 only is output, the following three cases are possible:
- Intermittent trouble occurred previously, but it is now normal.
- The problem has been corrected, but clearing of code 41 has been forgotten.
- There is a malfunction in the circuit for code 41.

Focusing on the circuit of the malfunction code stored in step 3, use the simulation method 6 in order to simulate the malfunction. If the malfunction occur, proceed to step 7; if not, pr to step 12.

NOTICE: When connecting the battery after clearing the malfunction code, always do it with the ignition switch in LOCK position.
When the battery has been reconnected, turn the ignition switch to ACC or ON position after at least 2 seconds have elapsed.
If the battery is reconnected with the ignition switch in ACC or ON position, or the ignition switch is turned to ACC or ON within 2 seconds of connecting the battery, it is possible that the diagnosis system will not operate normally.

- Determine the malfunction in the airbag system in step [6] by whether or not a malfunction code other than code 41 is output.

DIAGNOSTIC CODE CHART

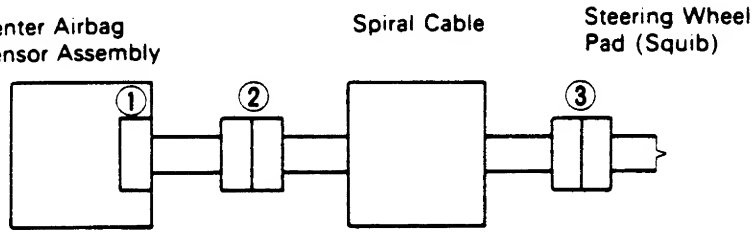
Proceed to the appropriate flow chart in step [8] in accordance with the malfunction code found in step [5] or [6].

CIRCUIT INSPECTION [9] REPAIR

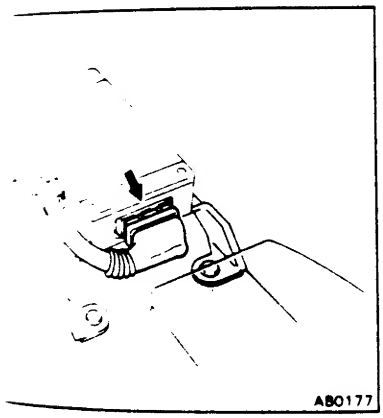
Find out if the problem lies in a sensor, actuator or wire harness and connector, and repair the problem. After the problem part is repaired, reinstall the disassembled parts. Do not start work until at least 20 seconds after the ignition switch is turned to the LOCK position and the negative (–) terminal cable is disconnected.

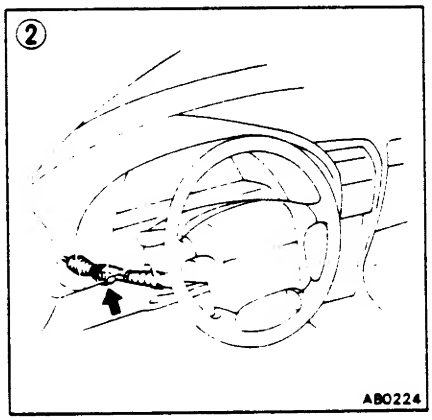
CAUTION: **If incorrect procedure is used, a malfunction may occur in the system or there is the danger that the airbag may be accidentally activated during the repair operation. Carefully read the GENERAL DESCRIPTION (See page AB-2) and the cautions for each operation, and perform repairs in the correct order using the correct methods.**

- The following illustration for the CIRCUIT INSPECTION shows each connector for the circuit from the center airbag sensor assembly to the steering wheel pad (squib).

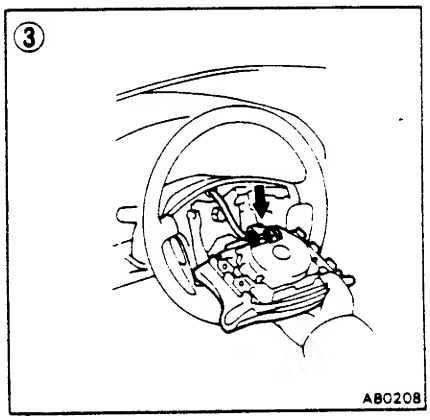


AB0091


AB0177



AB0224



AB0208

CLEARING OF MALFUNCTION CODE (EXCEPT CODE 41)

When all the malfunction codes found in steps [5] and [6] have been repaired, clear the malfunction codes.

11 DIAGNOSTIC CODE CHECK

After repeating ignition switch ON – OFF operation (ON: wait 20 secs., OFF: wait 20 secs.), check the diagnostic codes. If only code 41 is displayed, proceed to step 12. If a code other than 41 is displayed, return to step 7 and troubleshoot the displayed malfunction code.

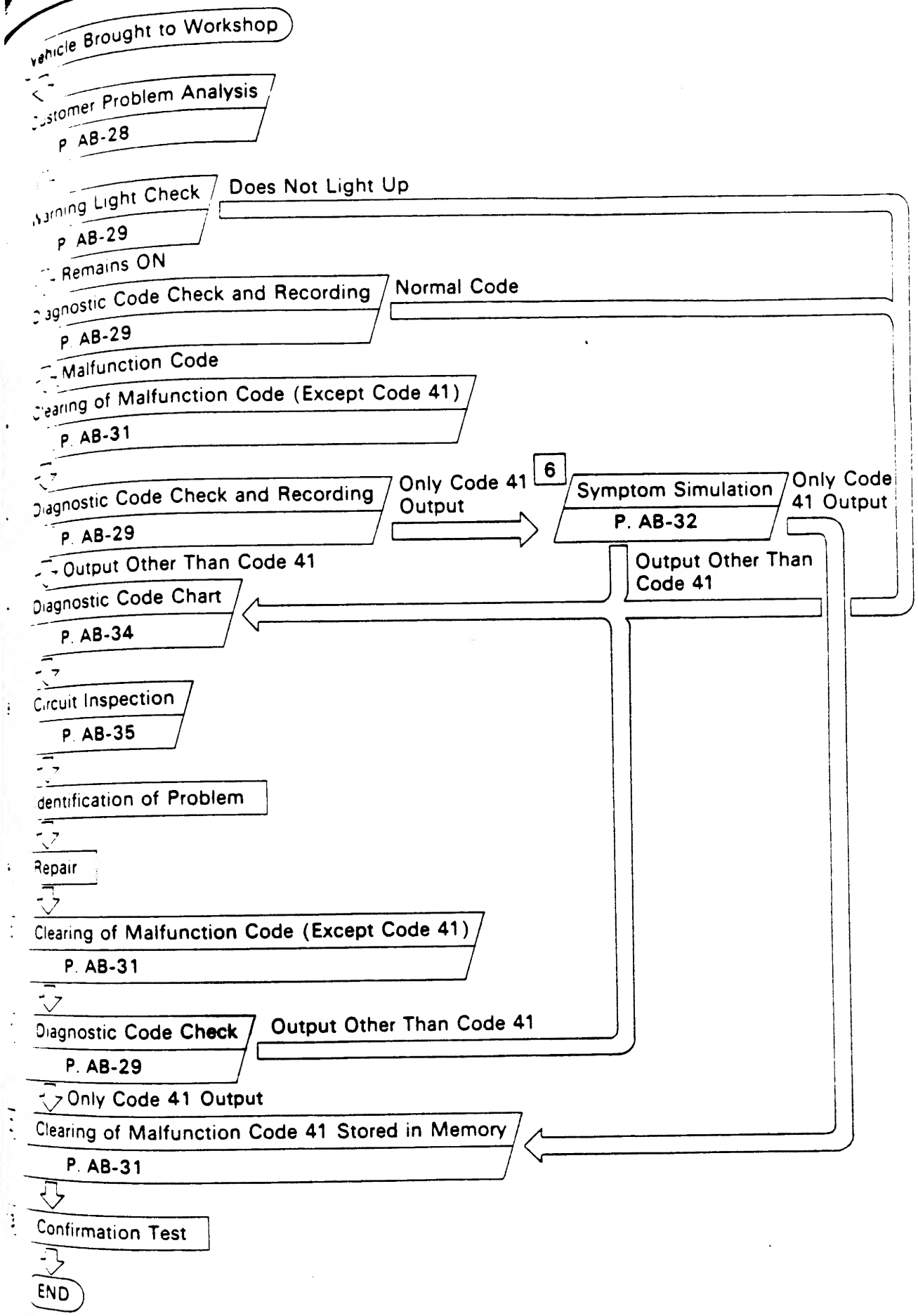
NOTICE: When connecting the battery after clearing the malfunction code, always do so with ignition switch in LOCK position.
When the battery has been reconnected, turn the ignition switch to ACC or ON position only after at least 2 seconds have elapsed.
If the battery is reconnected with the ignition switch in ACC or ON position, or the ignition switch is turned to ACC or ON within 2 seconds of connecting the battery, it is possible that the SRS system will not operate normally.

12 CLEARING OF MALFUNCTION CODE 41 STORED IN MEMORY

Clear the malfunction code 41 stored in memory. This operation is not necessary only in case the power source voltage returns to normal.

13 CONFIRMATION TEST

Check the warning light again and confirm that all the malfunctions have been repaired. If the warning light indicates an abnormality, repeat the operation again from step 2. If code 41 is output in step 3, skip steps 4 and 5 and proceed to step 7.



Customer Problem Analysis Check Sheet

SRS AIRBAG System Check Sheet

Inspector's Name

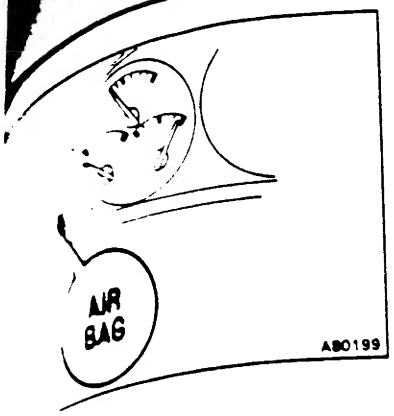
Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	

Date of Problem Occurrence		/ /
Conditions at Time of Problem Occurrence	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Oth
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °C (°F))
	Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Decelera ☐ Other (
	Condition of road	[

Details of Problem	
Vehicle Inspection, Repair History Prior to Occurrence of Malfunction (Including Airbag System)	

(Diagnosis System Inspection)

Airbag Warning Light Inspection	1st Time	☐ Remain On ☐ Sometimes Lights Up ☐ Does Not Light U
	2nd Time	☐ Remain On ☐ Sometimes Lights Up ☐ Does Not Light U
Diagnostic Code Inspection	1st Time	☐ Normal Code ☐ Malfunction Code [Code.]
	2nd Time	☐ Normal Code ☐ Malfunction Code [Code.]



Diagnosis Inspection

AIRBAG WARNING LIGHT CHECK

(a) Turn the ignition switch to ACC or ON and check that the airbag warning light lights up.

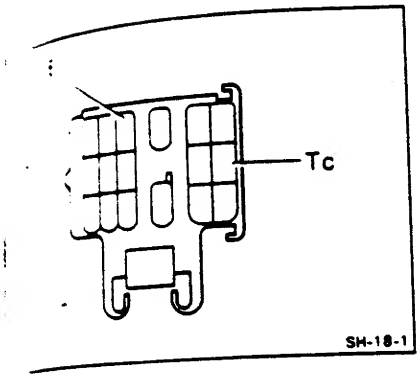
(b) Check that the airbag warning light goes out after approx. 6 seconds.

HINT:

- When the ignition switch is at ACC or ON and the airbag warning light remains on, the center airbag sensor assembly has detected a malfunction code.
- If, after approx. 6 seconds have elapsed, the airbag warning light sometimes lights up or the airbag warning light lights up even when the ignition switch is OFF, a short in the airbag warning light circuit can be considered likely.
  Proceed to "Airbag warning light system (always lit up)" on page AB-75.

DIAGNOSTIC CODE CHECK

1. OUTPUT DIAGNOSTIC CODE



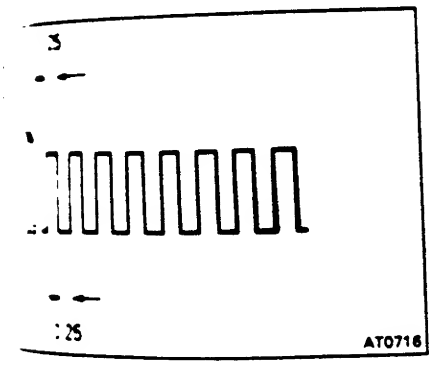
(a) Turn the ignition switch to ACC or ON position and wait approx. 20 seconds.

(b) Using SST, connect terminals T_C and E_1 of the check connector.

SST 09843-18020

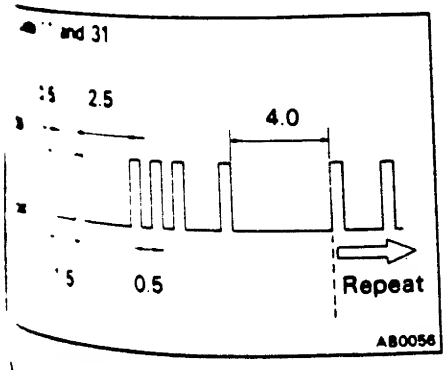
NOTICE: Never make a mistake with the terminal connection position as this will cause a malfunction.

2. READ DIAGNOSTIC CODE



Read the diagnostic code as indicated by the number of times the airbag warning light blinks.

- **Normal code indication**
  The light will blink 2 times per second.
- **Malfunction code indication**
  In the even of a malfunction, the light will blink.
  The first number of the code No. will equal the first digit of a 2-digit diagnostic code, and after a 1.5 second pause, the 2nd number of the code No. will equal the 2nd digit. If there are two or more codes, there will be a 2.5 second pause between each.
  After all the codes have been output, there will be a 4.0 second pause and they will all be repeated.
  HINT:
  - In the event of a number of trouble codes, indication will begin from the smaller numbered code to the larger.
  - If a diagnostic code is not output or is continuously output, proceed to the Tc terminal circuit inspection on page AB-77.



DIAGNOSTIC CODES

Code No.	Blink Pattern	Diagnosis	Trouble Area
(Normal)	 FI1401	• System normal	-
		• Source voltage drop	• Battery • Center airbag sensor assembly
11	 AB0057	• Short in squib circuit or front airbag sensor circuit (to ground)	• Steering wheel pad (squib) • Front airbag sensor • Spiral cable • Center airbag sensor assembly • Wire harness
12	 FI1389	• Short in squib circuit or front airbag sensor circuit (to +B)	• Steering wheel pad (squib) • Front airbag sensor • Spiral cable • Center airbag sensor assembly • Wire harness
13	 FI1390	• Short in squib circuit (between D^+ wire harness and D^- wire harness)	• Steering wheel pad (squib) • Spiral cable • Center airbag sensor assembly • Wire harness
14	 FI1391	• Open in squib circuit	• Steering wheel pad (squib) • Spiral cable • Center airbag sensor assembly • Wire harness
15	 AB0058	• Open in front airbag sensor circuit	• Front airbag sensor • Center airbag sensor assembly • Wire harness
22	 FI1392	• Airbag warning light system malfunction	• Airbag warning light • Center airbag sensor assembly • Wire harness
31	 FI1394	• Center airbag sensor assembly malfunction	• Center airbag sensor assembly
41	 FI1396	• Malfunction stored in memory	• (Center airbag sensor assembly)

HINT:

- When the airbag warning light remains lit up and the diagnostic code is the normal code, this s source voltage drop.
  This malfunction is not stored in memory by the center airbag sensor assembly and if the pow voltage returns to normal, after approx. 10 seconds the airbag warning light will automatically
- Code 22 is recorded when a malfunction occurs in the airbag warning light system.
  If an open malfunction occurs in the airbag warning light system, the airbag warning light does up, so that until the malfunction is repaired, the diagnostic codes (including code 22) ca confirmed.
- When a malfunction occurs in the airbag system, malfunction codes 11 to 31 are output. After the malfunction indicated by malfunction codes 11 to 31, codes 11 to 31 are cleared from the but code 41 is output instead.
  Once the malfunction has been detected, the airbag warning light will remain lit up until cod cleared, even though the malfunction has been repaired.
- When two or more codes are indicated, the lowest numbered code will appear first.
- If a code not listed on the chart is displayed, then the center airbag sensor assembly is faulty.

Diagnostic Code Chart

If a malfunction code is displayed during the diagnostic code check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit).

Code No.	Diagnosis	Page
(Normal) *1	• Source voltage drop	
11	• Short in squib circuit or front airbag sensor circuit (to ground)	
12	• Short in squib circuit or front airbag sensor circuit (to +B)	
13	• Short in squib circuit (between D^+ wire harness and D^- wire harness)	
14	• Open in squib circuit	
15	• Open in front airbag sensor circuit	
22 *2	• Airbag warning light system malfunction	
31	• Center airbag sensor assembly malfunction	AB-71
41 *3	• Malfunction stored in memory	

HINT:

*1 When the airbag warning light remains lit up and the diagnostic code is the normal code, this may a source voltage drop.

*2 Code 22 is recorded when a malfunction occurs in the airbag warning light system.
If an open malfunction occurs in the airbag warning light system, the airbag warning light does not light up, so that until the malfunction is repaired, the diagnostic codes (including code 22) cannot confirmed.

*3 When a malfunction occurs in the airbag system, malfunction codes 11 to 31 are output. After repairing the malfunction indicated by malfunction codes 11 to 31, codes 11 to 31 are cleared from the memory but code 41 is output instead.
Once the malfunction has been detected, the airbag warning light will remain lit up until code 41 is cleared, even though the malfunction has been repaired.

Problem Symptom Chart

Proceed with troubleshooting of each circuit in the table below.

Problem Symptom	Inspection Item	Page
• With the ignition switch at ACC or ON, the airbag warning light sometimes light up after approx. 6 seconds have elapsed. • Airbag warning light lights up even when ignition switch is in the LOCK position.	• Airbag warning light system (Always lit up)	AB-75
• Diagnostic code not displayed. • Diagnostic code continuously displayed.	• Tc terminal circuit	AB-77